

ART. 20. — *Descriptions of Two New Species of May-flies (Order Plectoptera) from New Zealand.*

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Plate 19.

THE may-flies, which belong to a very distinct and primitive order, called by some authors the Plectoptera, by others the Ephemeroptera, are well represented in New Zealand, though the introduction of the various species of trout has greatly diminished the abundance of the larger species, and one or two of the finest of them appear to be on the verge of extinction. Thirteen species, belonging to six genera and three families, have already been described, while a considerable number of the smaller species have not yet been worked out. In the present paper two fine new species are added, one belonging to the Siphuridae, the other to the Ephemeridae.

The opportunity is taken in this paper to offer an entirely new venational notation for the order. This is given in fig. 1. This interpretation of the venational scheme was first worked out from a study of the tracheation of the larval wings of New Zealand species of Siphuridae, and was later on found to agree exactly with the venational scheme of the very primitive Plectoptera described from the Upper Permian of Kansas by Sellards. A paper embodying these results is in course of preparation, and will be published elsewhere.

The plate showing the male imago and female subimago of *Ichthybotus bicolor* n. sp. has been prepared from a photograph taken by Mr. W. C. Davies, Curator of the Cawthron Institute, to whom I here desire to express my thanks. The text-figures have all been drawn with the Abbé camera lucida.

Family SIPHLURIDAE.

Genus AMELETUS Eaton.

*Ameletus flavitinctus* n. sp.

♀. *Imago*: Total length, 18 mm.; forewing, 19.5 mm.; hindwing, 7 mm.; expanse, 41 mm.

*Head* (somewhat shrivelled) small, dull medium brown; eyes dull-blackish.

*Thorax*: Pro- and meso-thorax rich umber-brown above; metathorax dark chocolate-brown above; sides dull brown shading to pale brown beneath; mesonotum with two blackish marks placed close up on either side of the median suture posteriorly. Legs short, pale brown, the femora with a broad black median band and a narrower black band at apex; tibiae marked with black apically; tarsi blackish, except for the bases of the first three segments, which are pale-brownish. Fig. 2, *g*, shows the tarsus of the hind leg, for comparison with that of *Ameletus ornatus* (fig. 2, *h*), an insect of somewhat smaller size but with much larger legs.

*Abdomen* narrow subcylindrical, tapering posteriorly. Segments 1-6 dark brown, heavily marked with dull-blackish in the form of a transverse basal band, from which project two elongated longitudinal marks, one on either side of the median line, and reaching to within a short distance of the apex of each segment; 7-8 paler brown, with similar blackish basal band, but with shorter longitudinal projecting marks, reaching only about half-way along each segment; 9 pale brown, with very narrow blackish basal band and slender longitudinal projecting marks; 10 pale brown, with narrow blackish basal band and no projecting marks. Ventral valve cleft in middle, its margin forming two rounded lobes (fig. 2, *f*); those of the other New Zealand species are shown for comparison in fig. 2, *d*, *e*. Cerci (partially shrivelled) somewhat longer than abdomen, brown, with darker segmental rings. Appendix dorsalis much reduced, only 3 mm. long, much shrivelled, with numerous minute obsolescent segments.

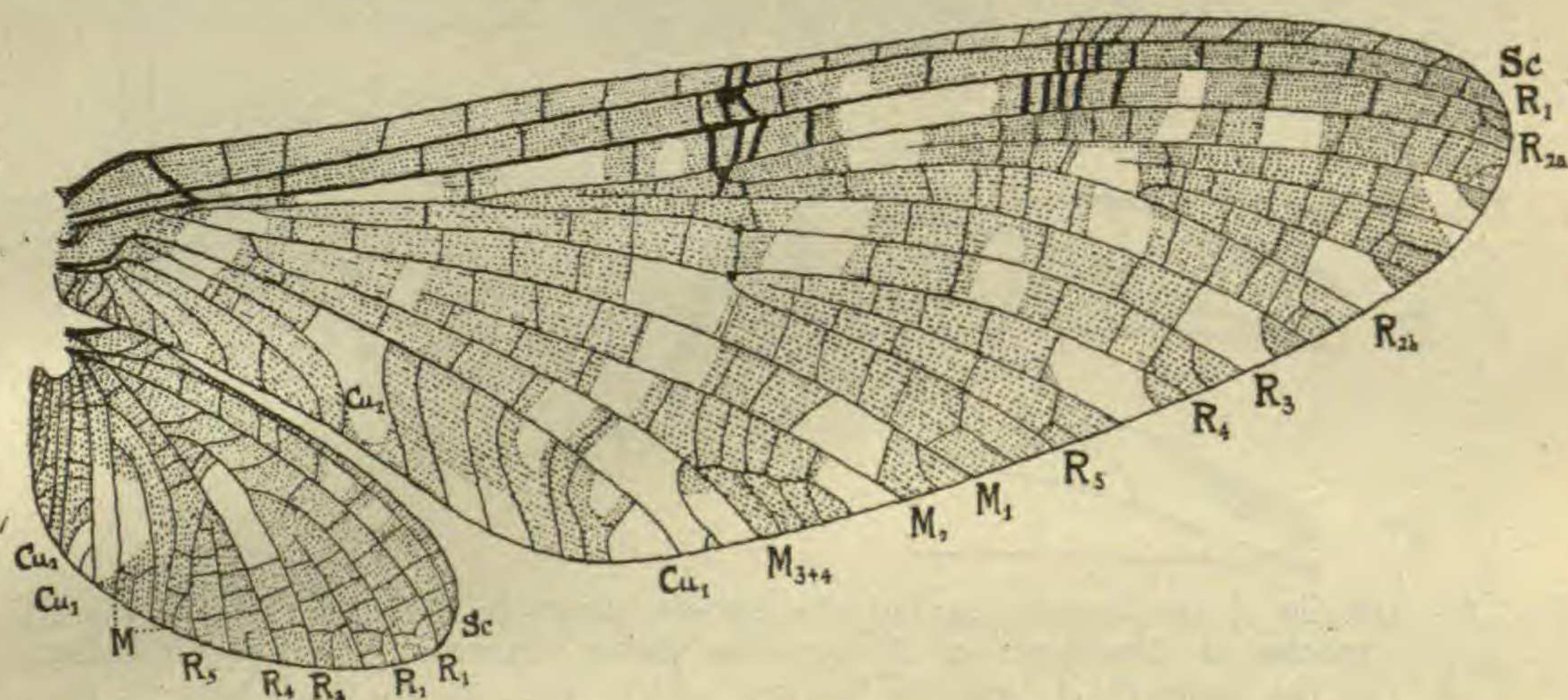


FIG. 1.—*Ameletus flavitinctus* n. sp.: female imago, wings.  $\times 5.4$ . The shaded portions of the wing represent the parts coloured pale transparent yellow, the unshaded portions those which are hyaline. Cu, cubitus; M, media; R, radius; Sc, subcosta. Note the positions of the two groups of thickened cross-veins and of the bullae in the forewing.

*Wings* brilliant, most of the membrane a pale transparent yellowish, but with certain areas left absolutely hyaline, as shown in fig. 1. It will be seen that these areas are chiefly those formed where the very irregularly placed cross-veins lie farthest apart. Veins blackish. Forewing with two groups of thickened black cross-veins between Sc, R<sub>1</sub>, and R<sub>2</sub>, one set being about half-way along the wing, the other below the proximal part of the pterostigma. There is a series of five definite spots or bullae on the forewing, on Sc, R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> respectively, the first three being large and situated in the midst of the first set of thickened cross-veins already mentioned, while the last two are smaller and situated below them. In shape the forewing is similar to that of *Ameletus ornatus* Eaton. Hindwing with the humeral angle as shown in fig. 2, *c*; the same portion of the hindwings of *A. perscitus* Eaton and *A. ornatus* Eaton are shown for comparison in fig. 2, *a*, *b*.

♀. *Subimago*: The specimen described above was captured in the subimaginal stage, but had changed into the imaginal stage before it was killed. The subimaginal stage has opaque wings, remarkably variegated in the bold manner shown in the subimago of *Atalophlebia versicolor* Eaton.

Male unknown.

*Type*.—Holotype female imago in Cawthron Institute collection.

*Locality*.—Stream above high waterfall at Wahi, near Tokaanu, southern end of Lake Taupo, 26th November, 1919 (R. J. T.).

This fine species is easily distinguished from *A. perscitus* by its slenderer build, its narrower wings with much less dense venation, and by the yellow colouring of the wings being paler and not covering the whole wing. It is more closely allied to *A. ornatus*, which it resembles closely in shape and venation, but can be at once distinguished from it by the colour-pattern of the wings both in the imago and subimago, by the presence of the two groups of thickened cross-veins on the forewing (*A. ornatus* ♀ has only the single group around the bullae), by the shape of the humeral angle of the hindwing, by the shortness and slenderness of the legs, and finally by the very differently shaped ventral valve. It should

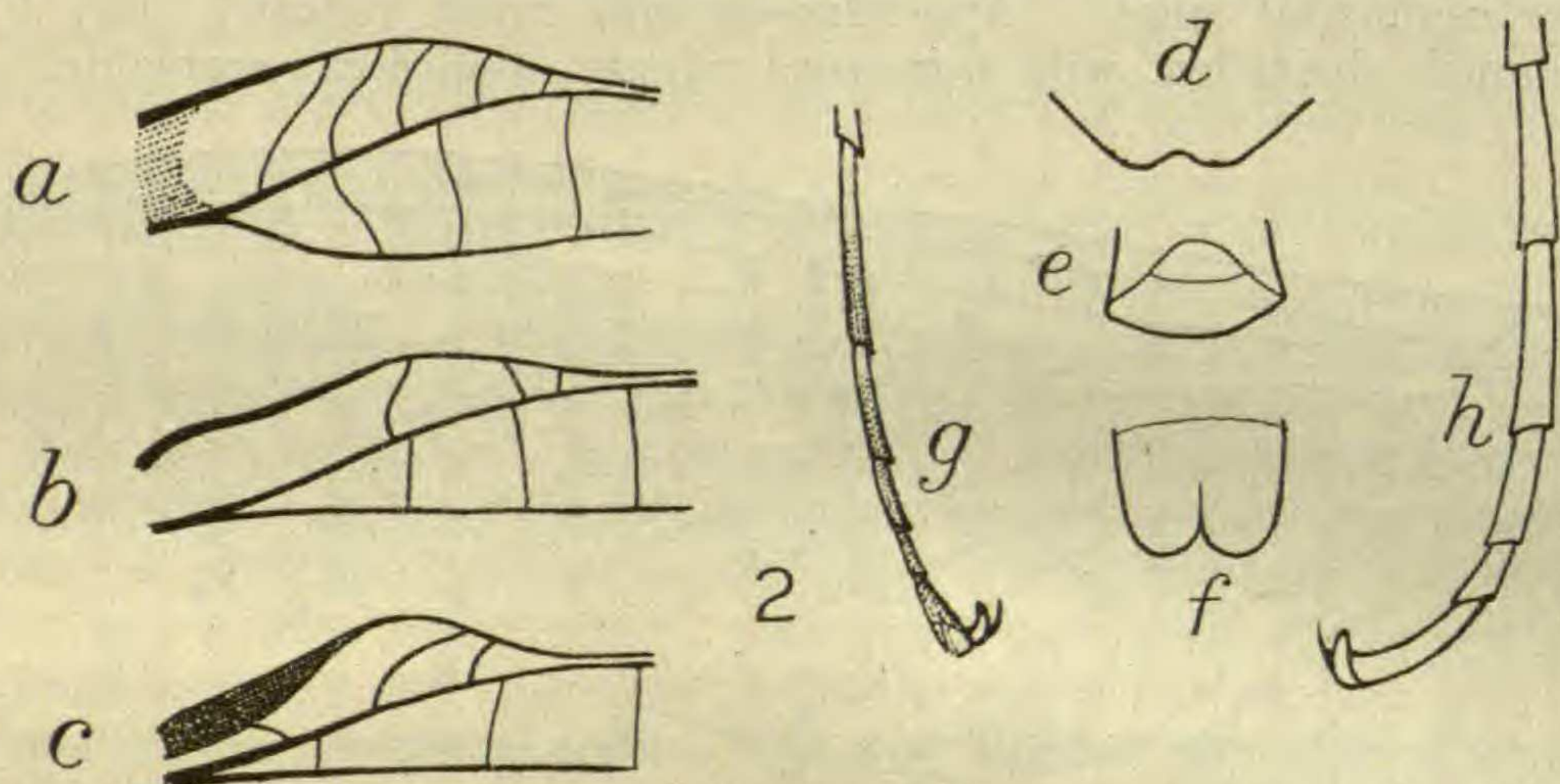


FIG. 2.—Details of the morphology of the female imago in the three New Zealand species of *Ameletus*: *a*, *A. perscitus* Eaton, humeral angle of hindwing; *b*, the same in *A. ornatus* Eaton; *c*, the same in *A. flavitinctus* n. sp.; *d*, *A. perscitus* Eaton, ventral valve; *e*, the same in *A. ornatus* Eaton; *f*, the same in *A. flavitinctus* n. sp.; *g*, *A. flavitinctus* n. sp., hind tarsus; *h*, *A. ornatus* Eaton, hind tarsus. All figures  $\times 14$ .

be noted, however, that some female imagines of *A. ornatus* show slight yellow colouring along the costal margin of the forewing, this tint being distinctly more greenish-yellow than lemon-yellow, and giving the insect a very peculiar appearance.

It seems advisable here to point out that *A. perscitus* Eaton differs very greatly from both *A. ornatus* Eaton and *A. flavitinctus* n. sp. in the shape of its wings, the density and regularity of their cross-venation, and in the remarkable structure of its large-headed larva. These characters, taken together, suggest that it is not really congeneric with them. Further than this, a study of the three New Zealand species shows that they differ considerably from the genotype, *A. subnotatus* Eaton, from North America, and it appears probable that they may have to be placed in two new genera.

#### Family EPHEMERIDAE.

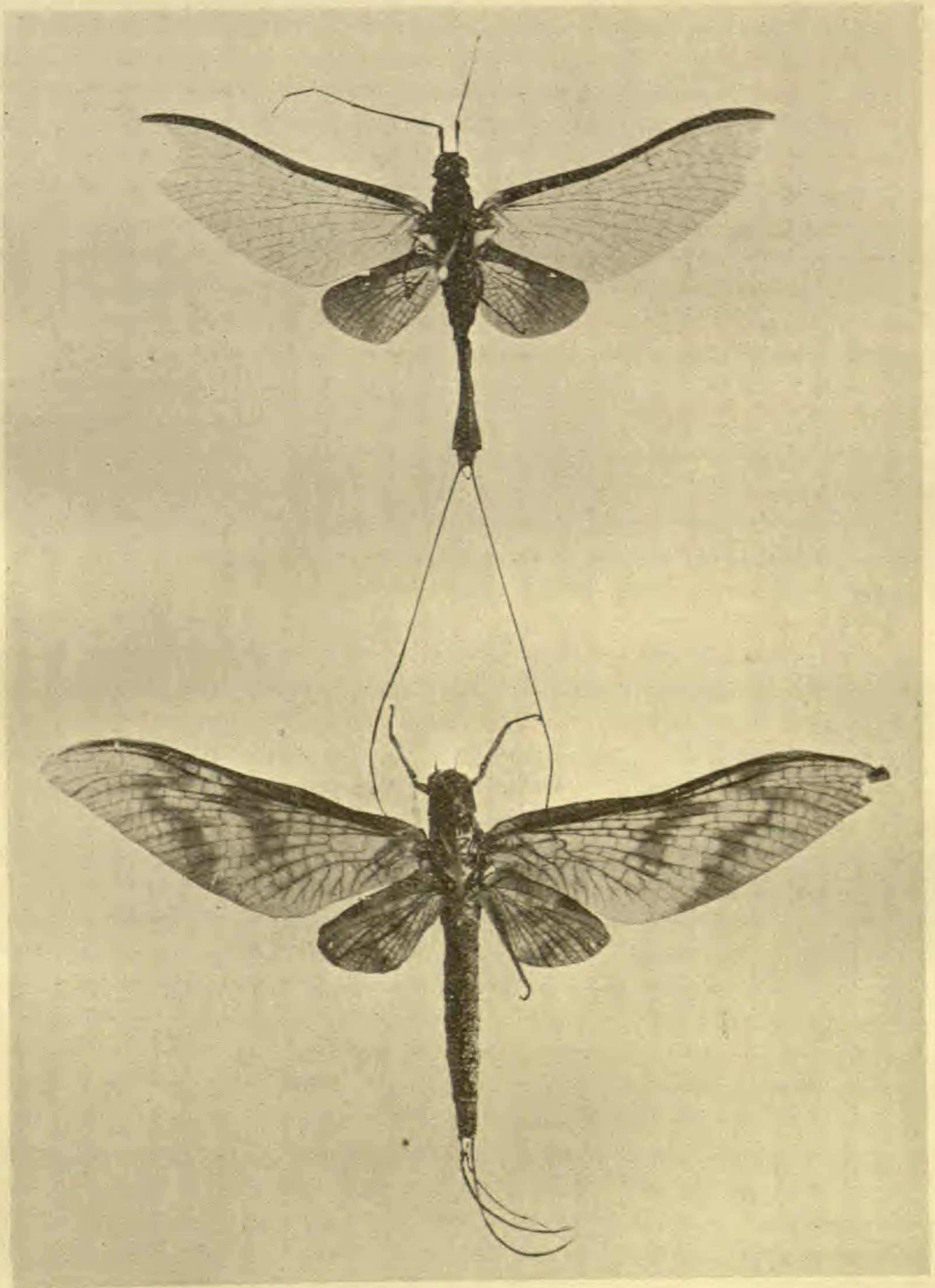
##### Genus ICHTHYBOTUS Eaton.

*Ichthybotus bicolor* n. sp. (Plate 19, and text-figs. 3-5.)

♂. *Imago*: Total length, 19 mm.; forewing, 16 mm.; hindwing, 6 mm.; expanse, 33 mm.

*Head* deep chocolate-brown; eyes blackish.

*Thorax* deep chocolate-brown; legs the same colour, except coxae and bases of the femora, which are paler. Foreleg 10.5 mm. long.



*Ichthyotus bicolor* n. sp. × 2. Upper figure, male imago ; lower figure, female subimago.

*Abdomen* deep chocolate-brown, faintly mottled with somewhat paler brown; in shape slender subcylindrical, slightly narrowed at 5-7, broadening again at 8-9; 9 much wider than 10, broader apically than basally. Cerci 23 mm. long, dark chocolate-brown, strongly formed, slightly hairy, the segments cylindrical with narrow black basal rings. Appendix dorsalis vestigial, 1 mm. long, with few segments.

*Appendages* of the same type as in *I. hudsoni* McL., but with the following differences: Forceps basis slightly shorter and cut off obliquely on either side of its posterior margin, which, between the bases of the forceps, is cut straight off, not double-curved as in *I. hudsoni* McL.; pale brown in colour, with a large shield-shaped central area of dark brown, with two black dots on it. Forceps with segment 1 broad, as in *I. hudsoni* McL., but more sharply angulated apically on the inner side; segment 2 very

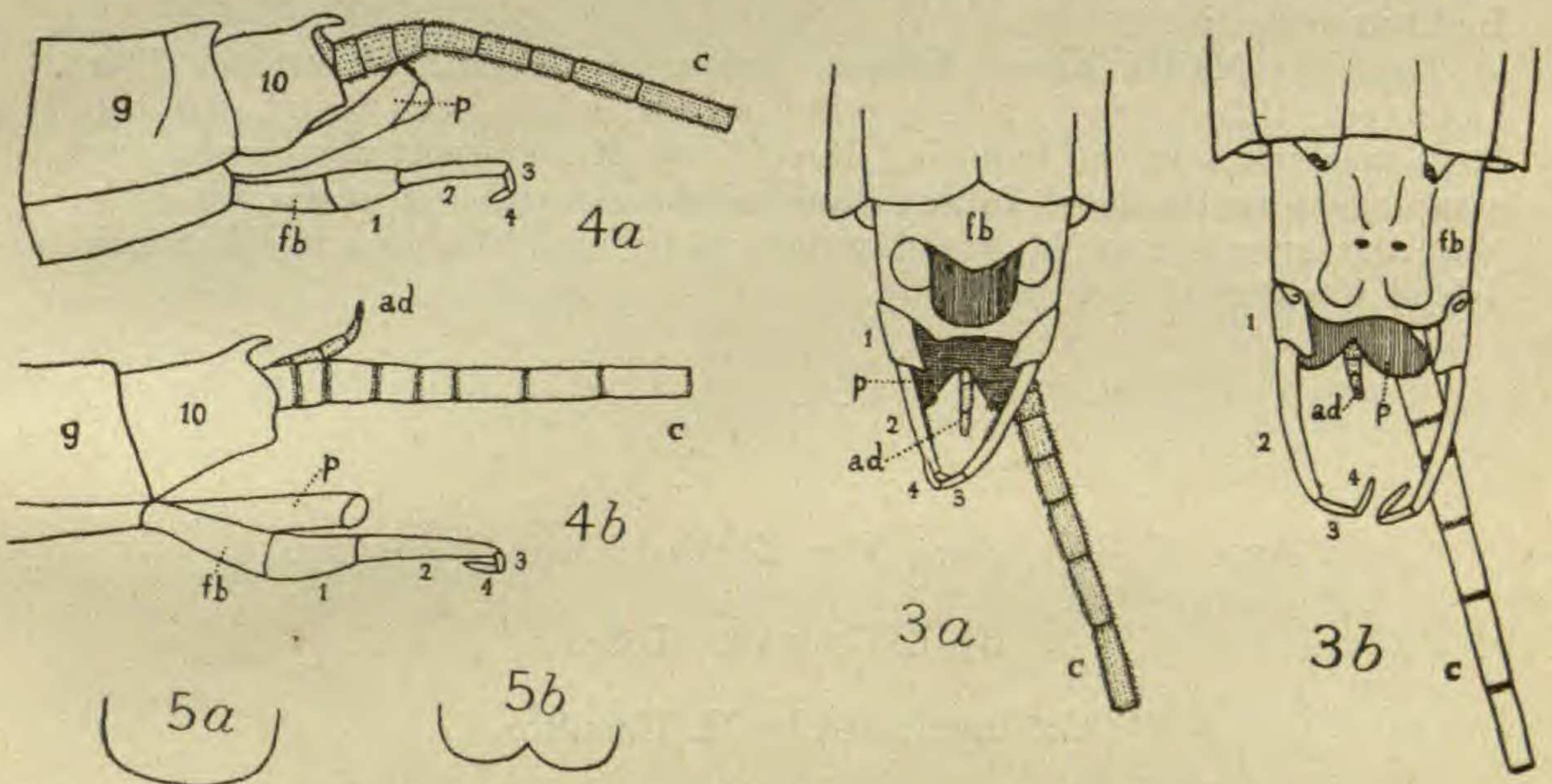


FIG. 3.—Ventral view of male appendages in the genus *Ichthybotus* Eaton: *a*, in *I. bicolor* n. sp.; *b*, in *I. hudsoni* McL. × 14. 1, 2, 3, 4, the four segments of the forceps; 9, 10, the last two abdominal segments; *ad*, appendix dorsalis; *c*, cercus (the right cercus is omitted); *fb*, forceps basis; *p*, penis.

FIG. 4.—Left lateral view of male appendages in the genus *Ichthybotus* Eaton: *a*, in *I. bicolor* n. sp.; *b*, in *I. hudsoni* McL. × 14. Right cercus and right forceps omitted. (For lettering see fig. 3.)

FIG. 5.—Outline of ventral valve in the female of *a*, *Ichthybotus bicolor* n. sp., and *b*, *I. hudsoni* McL. × 14.

long (but not so long as in *I. hudsoni* McL.), narrower, and with a row of minute hairs along the basal two-thirds of the inner margin; segments 3-4 very short, subequal. Penis more prominently lobed than in *I. hudsoni* McL., each lobe carrying a set of minute stiff hairs. Cerci 23 mm. long, dark chocolate-brown, strongly formed, slightly hairy, the segments cylindrical with narrow black basal rings; those of *I. hudsoni* McL. are quite hairless, yellowish-brown or orange-brown, with broad dark basal rings. Appendix dorsalis vestigial, 1 mm. long, with few segments.

In order that a careful comparison may be made between the appendages of the males of the two species, I have figured them both ventrally in fig. 3, and laterally in fig. 4.

The male may at once be distinguished from that of *I. hudsoni* McL. by its very dark coloration and its brown hindwings, as well as by the morphological differences given for the appendages.